

### **REMARKS**

Undersigned Applicants' representative wishes to thank Examiner Hightower for the helpful and courteous discussion regarding the merits of this application held on November 2, 2005 and for agreeing to remove the cited prior art references against the current claims. The substance of this discussion will be expanded upon in the remarks made below. The suggestions made by Examiner Hightower in both the interview and the Office Action have been adopted, therefore obviating the indicated rejections.

**The rejection of claims 4, 31-32, 42 and 43 under 35 U.S.C. 112, second paragraph is respectfully traversed.**

It is believed that the current amendment of the above identified claims obviates the rejection.

Applicants respectfully request the withdrawal of the rejection.

**The rejection of Claims 1-6, 12-15, 18-23, 27-28, 31-32, 34-39 and 44 under 35 U.S.C 102(b) as being anticipated by Kroner et al. (USP 5,747,635) is respectively traversed.**

What distinguishes the claims of the present application, as currently amended, from Kroner et al. is that the present claims require phosphoric acid, polyphosphoric acid or a mixture thereof in catalytic amount not to exceed 10% by weight based on the total weight of aspartic acid and the end-capping initiator.

In contrast, Kroner et al. neither disclose nor suggest the presence of phosphoric or polyphosphoric acids as part of components (a) or (b). (Column 3, lines 18-58). Further, Kroger et al. require phosphoric acid only when ethylenically unsaturated double bonds into polyaspartic acid to prepare a modified polyaspartic acid, in which case, the amount of phosphoric acid used by Kroner et al. is substantially an equal molar concentration of phosphoric acid to aspartic acid, as is clear from the statements:

“The introduction of ethylenically unsaturated double bonds into polyaspartic acid to prepare a modified polyaspartic acid with unsaturation as modifying feature is accomplished by polycondensation of aspartic acid with unsaturated carboxylic acids or anhydrides thereof, for example with maleic acid, maleic

anhydride, fumaric acid, aconitic acid and itaconic acid, in the presence of phosphoric acid.” (Column 6, lines 45-51).

And:

“For example, the condensation can be carried out using a mixture of **1 mol of phosphoric acid** and from 0.05 to 0.1 mol of hypophosphorus acid or a mixture of 1 mol of hydrochloric acid with from 0.05 to 0.5 mol of hypophosphorus acid **per mole of aspartic acid.**” (Column 8, lines 54-58, emphasis added).

Similar amounts are used in the Examples of Kroner et al. (column 12, lines 30-34; column 13, lines 50-60; column 14, lines 4-10). In contrast the present claims require a catalytic amount not to exceed 10 wt%.

Accordingly, Kroner et al. neither disclose nor suggest the range of phosphoric and polyphosphoric acid of the present claims. Concerning anticipation of ranges the MPEP states:

"When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with 'sufficient specificity to constitute an anticipation under the statute.' What constitutes a 'sufficient specificity' is fact dependent. If the claims are directed to a narrow range the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with 'sufficient specificity' to constitute an anticipation of the claims." (MPEP 2131.03)

It is submitted that, as stated above, the only amounts of phosphoric and polyphosphoric acids disclosed by the reference are of equal molar quantity to the amount of aspartic acid.

Clearly, Kroner et al. neither disclose nor suggest the claims of the present application as currently amended. Applicants respectfully request the withdrawal of the rejection.

**The rejection of Claims 1-5, 12, 13, 15, 22 and 23 under 35 U.S.C 102(b) as being anticipated by Schubart (USP 6,395,870) is respectively traversed.**

Schubart, invention is based in the absence of phosphoric acid and thus, he teaches away from the claims of the present application, as currently amended. Schubart specifically states:

Disadvantages of the known processes are that they are very complex and in many cases lead to products having unsatisfactory biodegradability, and also that purification during the production process entails considerable expense. In the case of the condensation of aspartic acid with phosphoric acid, condensation is necessarily **followed by laborious separation of the phosphoric acid.**

The object of the invention is therefore to provide an improved process for preparing polymers having repeating, fully biodegradable succinyl units, especially PSI and PAA, in which **it is no longer necessary to conduct virtually any laborious purification operations after the condensation.** (Column 2, lines 8-19, emphasis added).

Clearly, Schubart neither discloses nor suggests the claims of the present application as presently amended. Applicants respectfully request the withdrawal of the rejection.

**The rejection of the claims under 35 U.S.C. 102(e) as being anticipated by Swift et al. (USP 6,903,181) is respectfully traversed.**

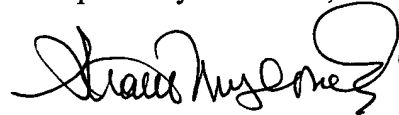
As agreed upon during the above mentioned interview with the Examiner, the rejection over Swift was inadvertent and should have been an obviousness-type double patenting rejection. The attached terminal disclaimer is submitted, as agreed upon with Examiner Hightower, in order to advance the prosecution of the application, obviating a future obviousness-type double patenting rejection.

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Reply to Office Action of: 09/26/2005  
Docket No.: 103-005-CIP

Applicants submit that the application is now ready for allowance and early notification to that effect will be greatly appreciated.

Customer No.: 28727

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Stamatios Mylonakis", with a large, stylized flourish at the end.

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### MARKED-UP SHEET

**Claim 1.** A method for preparing a copolymer containing succinimide moieties, which comprises, polymerizing aspartic acid in the presence of an end-capping initiator and further comprising phosphoric acid, polyphosphoric acid or a mixture thereof in a catalytic amount not to exceed 10% by weight based on the total weight of aspartic acid and the end-capping initiator, to form the copolymer.

**Claim 4.** The method of ~~Claim 1~~ Claim 2, wherein said carboxylic acid is selected from the group consisting of benzoic acid, thiolsuccinic acid and terephthalic acid.

**Claim 22.** The method of Claim 1, wherein said polymerization is carried out in a medium selected from the group consisting of a solvent, and a supercritical fluid.

**Claim 31.** The method of Claim 1, wherein said ~~derivative~~ copolymer exhibits a weight average molecular weight of from 1,000 to 150,000.

**Claim 32.** The method of Claim 1, wherein said ~~derivative~~ copolymer exhibits a weight average molecular weight of from 1,000 to 10,000.

**Claim 38.** A method for preparing a copolymer of L-aspartic acid, which comprises, polymerizing aspartic acid in the presence of an end-capping initiator and a catalyst to form the copolymer of L-aspartic acid; wherein said catalyst is selected from the group consisting of a Lewis acid and an organometallic catalyst.

**Claim 40.** The method of ~~Claim 39~~ Claim 38, wherein said organometallic catalyst is tin octanoate.

**Claim 42.** The method of ~~Claim 41~~ Claim 41, wherein said polymer additive is selected from the group consisting of a stabilizer, an antioxidant, a hindered phenol, an amine, a phosphite, a thioester, a sulfite, a metal salt of a dithioacid, a colorant, a plasticizer, a reinforcing agent and a lubricant.

**Claim 43.** An article prepared by processing the ~~derivative~~ copolymer of Claim 1.

*Hawley's*  
*Condensed Chemical*  
*Dictionary*

**TWELFTH EDITION**

*Revised by*

**Richard J. Lewis, Sr.**



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CIP

**catalysis, homogeneous.** A catalytic reaction in which the reactants and the catalyst comprise only one phase, e.g., an acid solution catalyzing other liquid components.

**catalyst.** Any substance of which a small proportion notably affects the rate of a chemical reaction without itself being consumed or undergoing a chemical change. Most catalysts accelerate reactions, but a few retard them (negative catalysts, or inhibitors). Catalysts may be inorganic, organic, or a complex of organic groups and metal halides (see catalyst, stereospecific). They may be either gases, liquids, or solids. In some cases their action is destructive and undesirable, as in the oxidation of iron to its oxide, which is catalyzed by water vapor, and similar types of corrosion. The life of an industrial catalyst varies from 1000 to 10,000 hours, after which it must be replaced or regenerated.

Though it is not a "substance," light in both the visible and ultrashort wavelengths can act as a catalyst, as in photosynthesis and other photochemical reactions, e.g., as polymerization initiator and cross-linking agent.

Catalysts are highly specific in their application. They are essential in virtually all industrial chemical reactions, especially in petroleum refining and synthetic organic chemical manufacturing. For details of application, see the following list. Since the activity of a solid catalyst is often centered on a small fraction of its surface, the number of active points can be increased by adding promoters which increase the surface area in one way or another, e.g., by increasing porosity. Catalytic activity is decreased by substances that act as poisons that clog and weaken the catalyst surface, e.g., lead in the catalytic converters used to control exhaust emissions.

Besides inorganic substances, there are many organic catalysts that are vital in the life processes of plants and animals. These are called enzymes and are essential in metabolic mechanisms, e.g., pepsin in digestion. Synthetic organic catalysts have been developed which imitate the action of enzymes such as chymotrypsin. Such model catalysts are examples of biomimetic chemistry. They approach the catalytic activity of natural enzymes.

Following is a partial list of catalysts; an asterisk indicates a destructive effect.

Substance	Reaction Type
aluminum chloride	condensation (Friedel-Crafts)
aluminum alkyl + titanium chloride	Ziegler catalyst for stereospecific polymers
aluminum oxide	hydration dehydration
ammonia	condensation (polymers)

chromic oxide

cobalt

copper salts  
ferric chloride  
hydrogen fluoride

iodine

iron

iron oxide

manganese dioxide  
molybdenum oxide

nickel

phosphoric acid

platinum metals

silica-alumina  
silver  
sulfuric acid

triethylaluminum

vanadium pentoxide

water (esp. + NaCl)  
zeolites

methanol synthesis,  
aromatization, polymerization  
hydrocarbon synthesis (Oxo process)  
oxidation (of rubber)\*  
Friedel-Crafts  
alkylation, condensation, dehydration, isomerization  
condensation, alkylation  
ammonia synthesis, hydrocarbon synthesis  
dehydrogenation (oxidation)  
oxidation  
dehydrogenation, polymerization aromatization, partial oxidation  
hydrogenation (oils to fats), methanation  
polymerization, isomerization  
hydrogenation, aromatization, oxidation  
cracking hydrocarbons  
hydration, oxidation  
isomerization, corrosion\*  
polymerization (stereospecific)  
oxidation (sulfuric acid)  
oxidation (corrosion)\*  
cracking hydrocarbons

\*See also catalysis, enzyme, and following entries.

**catalyst, amphora.** Catalyst particles made from a slurry of critical viscosity by compressing it into spheres or droplets followed by unidirectional heating and air-drying on a moving belt, the spheres being supported by a powder bed material. This process results in particles from 1.5 to 6 mm Hg in diameter. The unique feature is the formation of an internal cavity having an orifice at one point, so that the particle roughly resembles a doughnut from which a bite has been taken. Since the shape of the cavity suggests an amphora (Greek vase), the catalyst was so named. This shape affords a higher surface-to-volume ratio than is possible with solid spheres and other conventional forms, with consequent greater efficiency. A variety of materials can be used, e.g., alumina, zeolites, metallic oxides, etc. Amphora catalysts are effective in a wide range of chemical processing applications (oxidation and reforming of hydrocarbons, hydrotreating).

**catalyst, negative.** See inhibitor.